


Five Year Review Report

Hagen Farm Superfund Site
Dane County, WI

Pursuant to CERCLA

Prepared By:

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Date

I. INTRODUCTION

A. Authority and Purpose

The United States Environmental Protection Agency (U.S. EPA), Region 5, conducted this statutory five-year review under Section 121 (c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The purpose of a statutory five-year review is to evaluate whether a completed remedial action remains protective of human health and the environment at sites where hazardous waste remains on-site at levels that do not allow for unlimited use and unrestricted exposure. The Type Ia review conducted for this site is applicable to a site at which response is ongoing. This review will be placed in the Site files and local repository for the Hagen Farm Superfund Site (the Site) in Dane County, Wisconsin.

B. Site History

The Site is located at 2318 County Highway A, approximately one mile east of the City of Stoughton, Dane County, Wisconsin. The Site is defined as the area within the Hagen Farm property boundary and the contaminant plume. The property is approximately 28 acres in size. Within the property boundary is approximately 10 acres of disposal area. The Site was operated as a sand and gravel pit prior to the late 1950s. The gravel pit was then used for disposal of waste materials from the late 1950s to the mid-1960s. Chemical wastes have adversely impacted the sub-waste soils and groundwater quality at the Site.

U.S. EPA placed the Site on the National Priorities List (NPL) in July 1987. Two potentially responsible parties (PRPs), Uniroyal, Inc. and Waste Management of Wisconsin, named by U.S. EPA in connection with the Site conducted a Remedial Investigation and Feasibility Study (RI/FS) for the Site from 1988 to 1992. During the RI, two operable units (OUs) were defined for the Site. The OU approach was agreed upon after discussions among U.S. EPA, WDNR, and the PRPs during the early phase of the implementation of the Work Plan for the RI. OU I, which is the Source Control Operable Unit (SCOU), is intended to address waste refuse and subwaste-soils. OU II, which is the Groundwater Control Operable Unit (GCOU), is intended to address the contaminated on- and off-property groundwater at the Site. For purposes of this report, “on-property groundwater” is defined as contaminated groundwater on and in the immediate vicinity of the main waste disposal area and “off-property groundwater” is defined as contaminated groundwater at any location within the plume other than in the area defined as on-property groundwater.

Operable Unit I - SCOU

The RI/FS for the SCOU was finalized in July, 1990. In general, the RI included the following conclusions: three disposal areas were present, with most of the waste being present in one main disposal area which was given the designation “waste disposal area A” or “area A”; hazardous substances were not detected in the two smaller disposal areas; area A is approximately six acres in size, an average of eight feet thick, and contains an estimated 67,650 cubic yards of waste; waste found in area A includes municipal waste, paint sludge, grease, rubber, plastic sheeting, and

several industrial chemicals; the major contaminants found in the waste and groundwater around the waste were tetrahydrofuran (THF), xylenes, toluene, benzene, ethylbenzene, acetone, 2-butanone, semi-volatiles, barium, lead, and mercury; the waste is in contact with groundwater; wastes are a continuing source for groundwater contamination; contaminants in the waste and groundwater around the waste pose an unacceptable risk to human health, primarily from direct contact, inhalation, and ingestion of on-Site groundwater under current- and future-use scenarios.

U.S. EPA, with State concurrence, issued a Record of Decision (ROD) for the SCOU on September 17, 1990. Remedial Design and Remedial Action for the SCOU at the Site were completed by the responsible party at the Site, under the enforcement authority of an Unilateral Administrative Order (UAO) issued to Waste Management in March, 1991.

Operable Unit II - GCOU

The RI/FS for the GCOU was finalized in April 1992. The RI for the GCOU presented the nature and extent of contamination in the groundwater and evaluated possible exposure pathways. In general, the report included the following conclusions and observations concerning contamination at the Site: 1) The contaminants causing the most concern in groundwater are VOCs. The most prevalent VOC in groundwater was THF with a maximum detected concentration of 630,000 parts per billion (ppb) (current State cleanup standard is 10 ppb); 2) The occurrence, concentration, and distribution of THF suggested that there is a THF plume originating from the disposal area and it extended down gradient (south) approximately 3,600 feet; 3) VOCs were not detected in samples collected from private wells during the investigation; 4) The results of a treatability study indicated that THF and other VOCs in groundwater can be effectively treated using activated biological sludge; and 5) Groundwater posed an unacceptable risk to human health, primarily from the potential ingestion of contaminated groundwater near the Site under current- and future-use scenarios.

U.S. EPA, with State concurrence, issued a ROD for the GCOU on September 30, 1992. Remedial Design and Remedial Action for the GCOU at the Site were completed by the responsible party (Waste Management) at the Site, under the enforcement authority of an UAO issued to Waste Management in November, 1992.

II. DISCUSSION

A. Remedial Objectives

The remedial action objectives of the ROD for the SCOU were to address the contamination source including waste refuse and subwaste-soils. The remedy selected to meet these objectives included:

- Consolidation of the three waste disposal areas into one area (area A);
- Capping of the consolidated wastes; and,
- Installation through the cap and operation of an In-Situ Vapor Extraction (ISVE) system.
- Evaluation of promoting natural microbial degradation activities of VOCs in the waste and subwaste-soils during implementation of the ISVE system.

The consolidation and capping portion of the selected remedial action for the SCOU addresses the source of contamination and reduces the potential human health risks by eliminating the direct contact and inhalation exposure routes. In addition, the capping and ISVE portion of the selected remedial action for the SCOU reduces contaminant loadings to the groundwater, providing the first step to eliminating potential human health risks associated with the groundwater ingestion scenario.

An ESD was issued in April of 1991. The ESD was initiated after the ROD was signed because information became available to U.S. EPA and WDNR which allows U.S. EPA to further refine the ISVE clean-up standard. The ROD goal for the ISVE was 90 percent removal of VOCs in the waste/subwaste-soils. U.S. EPA, with State concurrence, made the decision to use a state-of-the-art groundwater/soil-gas model ("model") for each VOC detected during the RI in the waste/sub-waste soils and/or the groundwater to determine the clean-up standard for the waste/subwaste-soils. In addition, the ISVE was to operate for at least two years prior to running the model. This would insure that data used for the model represented ISVE steady state conditions and reflected ISVE parameters over time. Using the model to determine the clean-up standard will ensure clean-up levels that are measurable and reliable, as well as consistent with the National Contingency Plan (NCP).

The remedial action objectives of the ROD for the GCOU were to address the contaminated on- and off-property groundwater at the Site source including waste refuse and subwaste-soils. The remedy selected to meet these objectives included:

- Extraction and treatment of on- and off-property groundwater;
- Treatment of extracted on-property groundwater using activated biological sludge (ABS) and treatment of extracted off-property groundwater using a technology to be determined by bench scale tests during the design phase;
- Discharge of treated groundwater to neighboring wetlands or the Yahara River located 1.5 miles due west of the Site;

- Treatment and disposal of sludges generated from the groundwater treatment and treatment of off-gasses emitted from the treatment process;
- Bench scale studies to determine the effect of nutrients and/or oxygen on contaminated groundwater with the goal of enhancing bioremediation in the aquifer; and,
- Monitoring of all private wells located around the Site.

Treatment technologies tested on a bench scale level for the off-property groundwater contamination included cascade aeration, biological treatment, air stripping, granular activated carbon (GAC), and ultraviolet (UV)-chemical oxidation. These tests indicated that biological treatment is the most effective treatment technology for contaminated off-property groundwater at this Site. In general, biological treatment will be used for treatment of all Site related groundwater VOC contamination. Biological treatment technologies proposed for this Site will destroy Site related VOC contamination.

The selected remedial action for the GCOU uses a permanent treatment system to eliminate the principal threats posed to human health by extracting contaminated groundwater from the contaminant plume until State health based cleanup levels are met and destroying the VOCs in the extracted groundwater. The selected remedy establishes cleanup standards based on the State of Wisconsin's criteria for protection of groundwater quality.

An ESD will be issued in September, 1996. The ESD documents and justifies three modifications to the selected remedy, as presented in the ROD. The ESD was prepared for the GCOU because information became available to U.S. EPA and WDNR during, and shortly after, the design phase of the project which made modifications to the ROD necessary and/or cost effective. The three modifications include: 1) discharge of treated groundwater back into the ground ("reinfiltration"), on-Site, and near up gradient of the capped waste disposal area instead of to the Yahara River or wetlands; 2) combining extracted on- and off-property groundwater into one influent stream and treating the single influent stream in an on-property treatment facility, as opposed to treating on- and off-property groundwater at two separate facilities; and, 3) the use of fixed film biological treatment (FFBT) to treat all extracted groundwater instead of ABS.

Concerning modification two; the ROD does not specifically state that separate treatment facilities are required for on- and off-property groundwater contamination treatment. This requirement is interpreted by the U.S. EPA. However, it is U.S. EPA's opinion that the technical approach should be included in the ESD in order to provide better clarity of the selected remedy to the public. Concerning modification three; FFBT is essentially the same as ABS, but uses a media such as plastic balls to allow the biological component (bacteria) of the treatment process to stick to and be "fixed" in-place. Tests conducted during the design showed that this method provides for better operation and contaminant removal efficiency than ABS.

B. Remedial Action

The remedial design/remedial action (RD/RA) for both operable units was conducted by one PRP, Waste Management of Wisconsin. Waste Management of Wisconsin settled claims against Uniroyal in December, 1992 and is currently the only participating PRP.

Operable Unit I - SCOU

The PRP, under U.S. EPA and WDNR oversight, completed the remedial design for waste consolidation and capping in August, 1991. On-Site construction began in September, 1991. In general, the remedial activities were conducted as planned. Two smaller areas were exhumed, consolidated into the main disposal area (area A), and area A was capped. Approximately 30,000 cubic yards of refuse were removed from the smaller areas and added to area A for a total of about 97,650 cubic yards requiring a cap. The total area of area A did not change. The cap is a multi-layer and geotextile solid waste design consisting of (from bottom to top) 24 inches of clay, 12 inches of drainage gravel, a non-woven geotextile fabric to provide filtration and to keep the gravel clean, 18 inches of rooting zone soil, and 6 inches of vegetative top soil.

Construction of the cap was completed in May, 1992. A final inspection of the cap was conducted on July 28, 1992 and included representatives from the U.S. EPA, WDNR, and the PRP. At that time, it was determined that the construction was implemented as designed. A final construction completion report ("Final Remedial Action Implementation Report") for the waste consolidation and capping was submitted to U.S. EPA and WDNR in June, 1992.

The PRP, under U.S. EPA and WDNR oversight, completed the remedial design for ISVE system in August, 1993. On-Site construction of the ISVE through the cap began in September, 1993. In general, the remedial activities were conducted as planned. The ISVE system consists of eight vapor extraction wells which are screened from the bottom of the waste through sub-waste soils down to groundwater and twenty nine gas probes screened at various depths designed to monitor extraction well effects at various depths and areas throughout and around the landfill. The ISVE will discharge VOCs directly to the atmosphere, untreated, in accordance with the substantive requirements of a State air use permit.

Construction of the ISVE system was completed in January 1994. The system was also in operation at that time and is currently operational. A final inspection of the ISVE was conducted on January 12, 1994 and included representatives from the U.S. EPA, WDNR, and the PRP. At that time, it was determined that the ISVE system was constructed as designed. A final construction completion report was submitted to U.S. EPA and WDNR in February, 1994.

A feasibility study presenting an evaluation of promoting natural microbial degradation activities of VOCs in the waste and subwaste-soils was submitted by the PRP to U.S. EPA and WDNR in September, 1994. In general, the feasibility study concluded that construction of an enhanced biological treatment system for the SCOU at the Site does not appear either feasible or cost effective. Such a system would provide limited biological enhancement given the relatively small

size of the landfill, the existing ISVE system alone is capable of enhancing the needed biological activity

without nutrient additions, and such a system would require excavating and removing significant sections of the cap. Construction activities in the cap would create a high potential for compromising the integrity of the cap. U.S. EPA and WDNR agree with this conclusion and, therefore, an enhanced biological treatment system will not be pursued at this time.

The state-of-the-art groundwater/soil-gas model providing VOC clean-up standards for the waste/subwaste-soils will be submitted to the U.S. EPA and WDNR in August, 1996. The model will demonstrate that the system is operating according to design and that the technology will reach the cleanup goals. Current verbal estimates have the cleanup goals for the system potentially being reached by 1999.

Operable Unit II - GCOU

The PRP, under U.S. EPA and WDNR oversight, completed the remedial design for the groundwater pump and treat system in May, 1995. On-Site construction began in November, 1995. The hiatus in time between the design completion and on-Site construction was related mainly to contract difficulties between the PRP and their contractor and back-orders for specialized pieces of equipment related to the treatment process such as a Site-specific sludge filter press.

In general, the remedial activities were conducted as planned. Significant modifications are documented in an ESD. The groundwater extraction system consists of four extraction wells within the contaminant plume; three on-property near the landfill and one off-property about 800 hundred feet due south of the landfill. The system as a whole is designed to pump between 80 and 130 gallons per minute. The treatment plant was constructed on-property, along the southern edge of the landfill. The treatment plant will treat extracted groundwater for VOCs and metals prior to discharge back into the ground through the infiltration gallery in accordance with the substantive requirements of a WPDES discharge permit. VOCs will be treated using fixed-film biological treatment. This process destroys VOCs, therefore U.S. EPA anticipates that air treatment technologies to capture off-gasses will not be necessary.

As documented in the ESD for the GCOU, the treated groundwater will be discharged on-Site into an infiltration gallery instead of the Yahara River. Bioremediation bench scale studies and computer modeling related to the infiltration gallery indicates that the gallery may help expedite the cleanup by flushing contaminants through the ground into the pumping wells and enhancing bioremediation through the introduction of oxygen rich effluent water into the aquifer. Based on the bench scale studies, U.S. EPA does not currently anticipate the need for additional nutrient loadings to the aquifer to enhance bioremediation activities beyond what will be supplied by the infiltration gallery.

Construction of the groundwater pump and treat system was completed in April 1996. A final inspection of the system was conducted on April 17, 1996 and included representatives from the U.S. EPA, WDNR, and the PRP. At that time, it was determined that the groundwater pump and

treat system was constructed as designed. The system began operation in May, 1996 and is currently operational. The system is anticipated to require an operational period of about 10 to 15 years to achieve groundwater cleanup goals (by the year 2010).

III. RECOMMENDATIONS

I recommend the continued operation of the ISVE system at the SCOU until soil clean-up standards are achieved. I also recommend the continued operation of the ISVE system at the SCOU to help accelerate the achievement of groundwater clean-up standards for groundwater contaminants of concern at the Site.

I recommend the continued operation of the groundwater extraction and treatment system at the GCOU to ensure continued capture of all groundwater contaminants and the achievement of groundwater clean-up standards for groundwater contaminants of concern at the Site.

IV. STATEMENT ON PROTECTIVENESS

I certify that the remedies selected for this site remain protective of human health and the environment.

V. NEXT FIVE-YEAR REVIEW

The next five-year review will be completed by August 15, 2001, which is five years from the date of this review which is approximately 5 years from the date on-site construction mobilization occurred for the SCOU at the Site (August 20, 1991).